© EPODOC / EPO

PN - JP6061056 A 19940304
TI - LAMINATED IMPEDANCE ELEMENT
FI - H01F1/34&A ; H01F17/00&D
PA - TDK CORP
IN - IKEDA TSUGIO; KUDO HITOSHI; SATO HIDEKAZU; KAIHARA NOBUO
AP - JP19920212766 19920810
PR - JP19920212766 19920810
DT - I

© WPI / DERWENT

AN - 1994-112808 [14]
TI - Laminated impedance element - has coil inside magnetic material made of nickel@, copper, zinc@ to obtain high impedance and reduce noise in simple structure NoAbstract
IW - LAMINATE IMPEDANCE ELEMENT COIL MAGNETIC MATERIAL MADE NICKEL@ COPPER ZINC@ OBTAIN HIGH IMPEDANCE REDUCE NOISE SIMPLE STRUCTURE NOABSTRACT
PN - JP6061056 A 19940304 DW199414 H01F17/00 011pp
IC - H01F1/34 ;H01F17/00
MC - L03-B02F
- V02-F01
DC - L03 V02
PA - (DENK) TDK CORP
AP - JP19920212766 19920810
PR - JP19920212766 19920810

© PAJ / JPO

PN - JP6061056 A 19940304
TI - LAMINATED IMPEDANCE ELEMENT
AB - PURPOSE:To obtain sufficient noise reduction effect by simple structure without complicating circuitry and increasing cost, by constituting magnetic substance of oxide magnetic substance whose main component is Ni, Cu, Zn based ferrite.
- CONSTITUTION:A magnetic substance 3 is constituted of oxide magnetic substance whose main component is Ni, Cu, Zn based ferrite. A coil 5 is formed by using a conductor pattern 2 composed of Ag-Pb alloy, via the magnetic substance 3. As to the oxide magnetic substance constituting the magnetic substance 3, Ni, Cu, Zn based ferrite which is composed of Fe_2O_3: Amol%, NiO: Bmol%, CuO: Cmol%, ZnO: Dmol%, and CoO: Emol%, is used where A+B+C+D+E=100mol%, 46<=A<=50, 0<=B<=50, 0<=C<=30, 0<=D<=35 and 0<=E<=30.
I - H01F17/00 ;H01F1/34
PA - TDK CORP
IN - IKEDA TSUGIO; others: 03
ABD - 19940602
ABV - 018290
GR - E1557
AP - JP19920212766 19920810

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-061056

(43)Date of publication of application : 04.03.1994

---

(51)Int.Cl. H01F 17/00
H01F 1/34

---

(21)Application number : 04-212766

(22)Date of filing : 10.08.1992

(71)Applicant : TDK CORP

(72)Inventor : IKEDA TSUGIO
KUDO HITOSHI
SATO HIDEKAZU
KAIHARA NOBUO

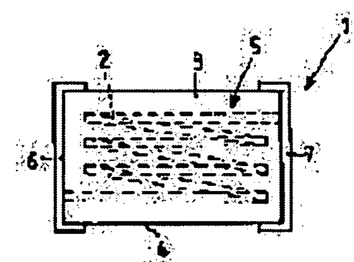
---

(54) LAMINATED IMPEDANCE ELEMENT

(57)Abstract:

PURPOSE: To obtain sufficient noise reduction effect by simple structure without complicating circuitry and increasing cost, by constituting magnetic substance of oxide magnetic substance whose main component is Ni, Cu, Zn based ferrite.

CONSTITUTION: A magnetic substance 3 is constituted of oxide magnetic substance whose main component is Ni, Cu, Zn based ferrite. A coil 5 is formed by using a conductor pattern 2 composed of Ag-Pb alloy, via the magnetic substance 3. As to the oxide magnetic substance constituting the magnetic substance 3, Ni, Cu, Zn based ferrite which is composed of Fe_2O_3: Amol%, NiO: Bmol%, CuO: Cmol%, ZnO: Dmol%, and CoO: Emol%, is used where $A+B+C+D+E=100$mol%, $46\leq A\leq 50$, $0\leq B\leq 50$, $0\leq C\leq 30$, $0\leq D\leq 35$ and $0\leq E\leq 30$.



LEGAL STATUS

[Date of request for examination] 10.08.1999

[Date of sending the examiner's decision of rejection] 22.05.2001

[Kind of final disposal of application other than the

examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] The laminating mold impedance component characterized by consisting of an oxide magnetic compact with which said magnetic substance uses nickel, Cu, and Zn system ferrite as a principal component in the laminating mold impedance component which has the coil which is connected through the magnetic substance and consists of an electric conduction pattern.
[Claim 2] Said oxide magnetic compact is Fe 2O3. : Laminating mold impedance component according to claim 1 which set A thru/or E as the range of 46<=A<=500<=B<=500<=C<=300<=D<=350<=E<=3 respectively when it consisted of Amol%, NiO:Bmol %, CuO:Cmol %, ZnO:Dmol %, and CoO:Emol % and considered as A+B+C+D+E=100-mol%.
[Claim 3] The laminating mold impedance component according to claim 1 or 2 which the mean particle diameter of the raw material at the time of mixing before sintering becomes [said oxide magnetic compact] from 1.0 micrometers or less.
[Claim 4] said electric conduction pattern -- Pd -- less than [5wt%] -- the laminating mold impedance component according to claim 1 formed with the conductor which consists of an Ag-Pd alloy to contain.
[Claim 5] The laminating mold impedance component according to claim 4 which said electric conduction pattern becomes from the Ag-Pd alloy with which purity contained 99.5% or more of Ag.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the laminating mold impedance component which is applied to various electronic equipment and works as a noise reduction component.
[0002]
[Description of the Prior Art] In recent years, many digital signal circuits are put in practical use by the advance of the circuit technique of various electronic equipment, and IC is broadly used especially as an active element. In case IC performs switching operation in such a signal circuit, a noise occurs, and this noise affects actuation of other surrounding circuit elements not a little.
[0003] In order to cancel such a fault, preparing respectively the noise reduction component which combined the noise filter, the chip inductor, and the chip capacitor, including in a signal circuit, and aiming at noise reduction is carried out.
[0004] However, since many component parts are needed while such a noise reduction component has an indispensable noise filter with a big configuration, circuitry not only becomes complicated, but a cost rise is not avoided.
[0005] For this reason, as shown in drawing 6 , the chip mold impedance component of easy structure is formed by forming the straight-line-like conductor 22 in the magnetic substance 21, in order to avoid such evil, and using this impedance component as a noise reduction component is performed.
[0006]
[Problem(s) to be Solved by the Invention] By the way, since a conductor is only formed in the shape of a straight line, and he is trying to constitute an impedance from a conventional chip mold impedance component, and only a low impedance is obtained, there is a problem that sufficient noise reduction effectiveness is not acquired.
[0007] It aims at offering the laminating mold impedance component which consists of one chip which can avoid a cost rise and can acquire sufficient noise reduction effectiveness with easy structure, without this invention's having coped with the above problems, having made it, and complicating circuitry.
[0008]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention is characterized by said magnetic substance consisting of an oxide magnetic compact which uses nickel, Cu, and Zn system ferrite as a principal component in the laminating mold impedance component which has the coil which is connected through the magnetic substance and consists of an electric conduction pattern.
[0009] Moreover, for other this inventions, said oxide magnetic compact is Fe 2O3. : When it consists of Amol%, NiO:Bmol %, CuO:Cmol %, ZnO:Dmol %, and CoO:Emol % and considers as A+B+C+D+E=100-mol%, it is characterized by setting A thru/or E as the range of 46<=A<=500<=B<=500<=C<=300<=D<=350<=E<=3 respectively.
[0010] Furthermore, as for other this inventions, said oxide magnetic compact is characterized by the mean particle diameter of the raw material at the time of mixing before sintering consisting of 1.0 micrometers or less.
[0011] furthermore, other this inventions -- said electric conduction pattern -- Pd -- less than [5wt%] -- it is characterized by being formed with the conductor which consists of an Ag alloy to contain.
[0012] Furthermore, other this inventions are characterized by said electric conduction pattern consisting of an Ag alloy with which purity contained 99.5% or more of Ag.

[0013]
[Function] According to the configuration of this invention according to claim 1, the coil which consists of an electric conduction pattern is prepared through the oxide magnetic compact which uses nickel, Cu, and Zn system ferrite as a principal component, and a laminating mold impedance component is formed.
[0014] According to the configuration of this invention according to claim 2, a laminating mold impedance component is formed by combining a specific component in the specific range respectively as a raw material of said oxide magnetic compact.
[0015] According to the configuration of this invention according to claim 3, when the mean particle diameter uses the thing of a specific value as a raw material of said oxide magnetic compact, a laminating mold impedance component is formed.
[0016] According to the configuration of this invention according to claim 4, a laminating mold impedance component is formed by combining a specific component in the specific range respectively as a raw material of said electric conduction pattern.
[0017] According to the configuration of this invention according to claim 5, a laminating mold impedance component is formed by using a specific component in the specific range as a raw material of said electric conduction pattern.
[0018]
[Example] With reference to a drawing, the example of this invention is explained below.
[0019] Drawing 1 is the outline sectional view showing the example of the laminating mold impedance component of this invention, and shows the structure in which the coil of three turns for example, was formed inside. this example laminating mold impedance component 1 has the magnetic substance 3 which consists of an oxide magnetic compact which uses nickel, Cu, and Zn system ferrite as a principal component, the coil 5 which consists of a spiral electric conduction pattern 2 which this magnetic substance 3 is connected through the layered product 4 sintered by one, and goes around, and the external terminals 6 and 7 of a pair respectively connected to the both ends of a coil 5.
[0020] Moreover, the oxide magnetic compact which constitutes said magnetic substance 3 is Fe 2O3. : When nickel which consists of Amol%, NiO:Bmol %, CuO:Cmol %, ZnO:Dmol %, and CoO:Emol %, Cu, and Zn system ferrite are used and it considers as A+B+C+D+E=100-mol%, A thru/or E are respectively set as the following range.
[0021] 46<=A<=500<=B<=500<=C<=300<=D<=350<=E<=3 [0022] moreover, the electric conduction pattern 2 which constitutes said coil 5 -- Ag -- Pd -- less than [5wt%] -- it is formed with the conductor which consists of an Ag-Pd alloy to contain.
[0023] Here, the equal circuit of the laminating mold impedance component 1 of this example of drawing 1 can be treated as a 2 terminal impedance component, and by having a coil 5 in the magnetic substance 3 can show it like drawing 2 . namely, a lost part and the conductor of the magnetic substance 3 -- it has a series circuit with the inductive reactance jomegaL which uses as a principal component the inductance of the equivalent resistance R which doubled resistance, and a coil 5, and the composition that parallel connection of the capacitive reactance-j (1-/omegaC) which is floating to the layered product 4 was carried out to this.
[0024] The impedance Z of an impedance component is shown like a degree type.
[0025]
[Equation 1]
Z={R/(omegaCR)2+(1-omega2 LC)2}+j {omegaL(1-omega2 LC)-omegaCR2/} / {(omegaCR) 2+(1-omega2 LC) 2}
[0026] Although this equal circuit is conventionally [which was shown in drawing 6] applicable also to a component, since the value of the component of jomegaL is low, that impedance characteristic becomes like B of drawing 4 , and serves as a small impedance from the property A of this example component. That is, in the case of this example component, the high impedance Z can be shown, and it can make the actuation which was excellent as a noise reduction component perform by forming a coil 5 in the magnetic substance 3.
[0027] That is, in the frequency band of the signal used in a circuit, an impedance Z is low enough so that the signal may not be attenuated, and an impedance component which presents the high impedance Z which fully attenuates this to a noise is called for. Since the noise component has a frequency component higher than a signal component, attenuation is demonstrated only to this high noise frequency component, and very low attenuation is demonstrated to a low signal frequency component, namely, the impedance component which produces a low insertion loss must be realized.
[0028] When its attention is paid to the frequency band of a signal, since the stray capacity C in the equal circuit of

drawing 2 is at most several pF, the equal circuit can be shown like drawing 3 in approximation. Therefore, an impedance Z becomes only Z=R+jomegaL and the absolute value of an impedance Z is shown like a degree type.
[0029]
[Equation 2]

$$|Z| = \sqrt{R^2 + \omega^2 L^2}$$

[0030] the conductor of the electric conduction pattern 2 which is making Resistance R so that clearly from this several 2 -- it becomes realizable by falling resistance to lower the impedance Z of an impedance component and to lower an insertion loss.
[0031] Ag with the lowest resistance is chosen in all conductor material in that what has low resistance is desirable as for the conductor material of the electric conduction pattern 2 which constitutes a coil 5. Although the melting point of this Ag is about 960.5 degrees C and has the value lower than the sintering temperature of the usual oxide magnetic compact, since about 100 degrees C or more of things for which the sintering temperature of the magnetic substance is lowered to the melting point of Ag will lower it rather than the usual sintering temperature, it is difficult from the point of making the magnetic substance equipped with a predetermined property. The melting point as a conductor material can be raised now at this point rather than Ag by making Ag contain Pd. Making the content of Pd increase not much will raise resistance of the Ag-Pd alloy as a conductor material, it will raise the impedance Z of an impedance component, and it becomes impossible however, to satisfy the conditions that only the noise required of a noise reduction component as a result must not be reduced, and the signal of a signal circuit must not be reduced.
[0032] [Table 1] shows change of the direct current resistance and the insertion loss at the time of changing various component ratios (wt%) of the Ag-Pd alloy used as a conductor material of the electric conduction pattern 2 which constitutes a coil 5 in this example.
[0033]
[Table 1]

Ｎｏ	Ａｇ：Ｐｄ	直流抵抗	挿入損失
1	100　0	0.20 Ω	0.04ｄＢ
2	99　1	0.29	0.04
3	98　2	0.38	0.05
4	96　4	0.57	0.07
5	95　5	0.66	0.07
6	94　6	0.75	0.08
7	92　8	0.94	0.10
8	90　10	1.12	0.11

[0034] Since it becomes higher than the case where the melting point is Ag100% so that the ratio of Pd of an Ag-Pd alloy is raised in [Table 1], it is necessary to also make sintering temperature of the magnetic substance high. However, direct current resistance and an insertion loss increase [tend] gradually and are not so desirable as the ratio of Pd is raised. Therefore, if both who are mutually contradictory are taken into consideration from a practical viewpoint, it can limit under the condition that Pd content with which an insertion loss is mostly equivalent to 0.07dB or less is the range where below five (wt%) is desirable practically. No.1 thru/or No.5 correspond to this.
[0035] Consequently, it is necessary to carry out low temperature sintering of the magnetic substance at the temperature below the melting point of conductor material. By choosing sintering temperature within the limits of this, the phenomenon which is desirable as for neither fusion of the Ag-Pd alloy which constitutes a conductor pattern 2, nor evaporation can be avoided, and the depression as a coil can be prevented.

[0036] That sintering temperature is set up in connection with the melting point of the Ag-Pd alloy which is the conductor of the electric conduction pattern 2 which forms on this the oxide magnetic compact which constitutes the magnetic substance 3 from the above thing. Usually, the sintering temperature of the oxide magnetic compact using nickel, Cu, and Zn system ferrite is set as 1,050 degrees C thru/or 1,100 degrees C. Moreover, as for Ag used, it is desirable to have 99.5% or more of purity.
[0037] Here, since it stops agreeing in the melting point of the Ag-Pd alloy of the component of said range in having used the thing of a presentation which has the usual sintering temperature (about 1,050 degrees C thru/or 1,000 degrees C) as an oxide magnetic compact of nickel, Cu, and Zn system ferrite, the device which lowers this sintering temperature is needed. Moreover, if the specific resistance of a ferrite ingredient is low, with the structure where the conductor pattern 2 touches the direct magnetic substance 3 directly like this example laminating mold impedance component 1, it will become difficult for the insulating engine performance between the coils of a coil 5 to come to be inferior, and to present practical use. For this reason, it is at least 105 as specific resistance. It has the resistance more than omegacm and it is necessary to prepare nickel of a presentation which has the sintering temperature below the melting point of the above mentioned Ag-Pd alloy, Cu, and Zn system ferrite.
[0038] In order to fill such a demand, it becomes possible by sintering using the presentation ingredient which made particle size small enough. [Table 2] shows change of the specific surface area at the time of changing the particle size of nickel and Cu which form the oxide magnetic compact which constitutes the magnetic substance 3, and Zn system ferrite ingredient, sintered density, and a presentation in this example.
[0039]
[Table 2]

No.	平均粒径 (μm)	比表面積 (m^2/g)	焼結密度 (g/cm^3)	組成 (mol%)			
				Fe_2O_3	NiO	CuO	ZnO
1	1.5	3.3	4.01	48.1	26.6	8.3	17.0
2	0.5	5.6	4.49	48.2	26.5	8.1	17.2
3	0.3	8.5	4.75	48.1	26.5	8.3	17.1

焼結温度：875℃

[0040] It sets to [Table 2] and they are the mean particle diameter of 0.5 micrometers, specific surface area of 5.6m 2 / g, and sintered density 4.5 g/cm3. By using the particle of extent, the oxide magnetic compact which has the sintering temperature enough ****(ed) by practical use is realizable. If the average of particle size is about 1.0 micrometers or less, it can obtain a desirable result.
[0041] The oxide magnetic compact which consists of nickel, Cu, and a Zn system ferrite ingredient is Fe 2O3, although the presentation ratio shows various magnetic properties. Since more 2nd phase to which the amount made NiO and CuO the subject less than [46mol%] is formed, the magnetic properties deteriorate and practical use is not presented. Moreover, Fe 2O3 When an amount exceeds 50-mol%, sintering temperature is alphaFe 2O3 below 950 degrees C. Since a phase is formed as the 2nd phase and this works as a factor which checks sintering, desirable sintering temperature cannot be acquired.
[0042] Furthermore, since Curie temperature descends to near ordinary temperature in the field beyond 35mol%, practical use will not be presented with the amount of ZnO(s). the presentation with little [further again] ZnO to the ferrite containing NiO -- at least -- CuO -- more than 4mol% -- since sintered density will become low if are not contained, and sintering temperature becomes 950 degrees C or less, practical use will not be presented. Moreover, although CuO shows magnetic properties more than 30mol%, since the fall of flux density is remarkable, it is not desirable in order for an allowable-current value to fall practically and for the engine performance to be inferior.
[0043] Next, the manufacture approach of the laminating mold impedance component of this example is explained.
[0044] (1) Dry after mixing each raw material with water with a steel ball with a ball mill for 16 hours so that the last presentation after manufacture grinding of a fine-particles ingredient may become ZnO17.0mol% CuO8.3mol% NiO26.6mol% Fe2 O3 48.1mol%. Next, dry fine particles are ****(ed) at 750 degrees C for 2 hours. After an after

[****] ball mill grinds with water and a steel ball for 50 hours, it dries and a fine-particles ingredient is obtained.
[0045] Here, 2 double weight of ingredient weight was respectively used [the 1/2 inch ball] for the conditions of a ball mill for 2 double weight and the 1/8 inch ball of ingredient weight by water, using the 3 time weight of ingredient weight as a steel ball. Moreover, desiccation was performed using the air forced oven held at 200 degrees C.
[0046] (2) Manufacture of the coating for laminatings, next (1) A pen shell mixer performs mixed churning for 20% of toluene, 20% of ethyl alcohol, 40% of butanol, and 4% of #N200 ethyl-cellulose resin to the obtained fine-particles ingredient for 1 hour. Then, the bead mill of 3mm of diameters phi of a bead is passed, and the coating for laminatings is obtained.
[0047] (3) Use a laminating and a baking laminating screen printer and it is (2). The green sheet layered product which you connected [layered product] the electric conduction pattern which should form the coil of three turns for example, through the coating for laminatings, and made it go around is obtained using the obtained coating (oxide magnetic compact ingredient) Ag paste for laminatings (paste containing an Ag-Pd alloy) by printing repeatedly by turns in the shape of [suitable] a substrate. Then, sintering processing of the green sheet layered product is carried out at 875 degrees C for 2 hours.
[0048] (4) Form an external terminal by carrying out sequential plating of Cu, nickel, and Ag on Ag layer baked by electroplating after applying Ag paste to the both ends of the layered product obtained by formation sintering of an external terminal and burning at 600 degrees C for 1 hour.
[0049] The laminating mold impedance component by which the coil 5 of 3 turns was formed in the interior as shown in drawing 1 according to each above process can be manufactured.
[0050] Drawing 5 shows the impedance characteristic of the laminating mold impedance component obtained by this example, the impedance of about 60 ohms is obtained by 10MHz, the impedance of about 600 ohms is obtained by 100MHz, and a desirable property is acquired.
[0051] Thus, without according to this example, coming to obtain a high impedance and complicating circuitry, since the coil was formed in the magnetic substance which consists of a specific presentation, a cost rise can be avoided and sufficient noise reduction effectiveness can be acquired with easy structure.
[0052] In addition, although the example in which the coil of 3 turns was formed in the magnetic substance explained in the example, this can be set as the number of arbitration according to the impedance characteristic which shows and needs an example. Moreover, the electric conduction pattern which forms a coil may form a multilayer straight-line-like parallel connection pattern not only in a pattern but in the interior around gone to a spiral, and the internal electric conduction pattern is arbitrary.
[0053]
[Effect of the Invention] Without complicating circuitry, since the coil was formed in the magnetic substance which consists of a specific presentation according to this invention as stated above, and an impedance can be raised, a cost rise can be avoided and sufficient noise reduction effectiveness can be acquired with easy structure.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention relates to the laminating mold impedance component which is applied to various electronic equipment and works as a noise reduction component.

[Translation done.]

PRIOR ART

[Description of the Prior Art] In recent years, many digital signal circuits are put in practical use by the advance of the circuit technique of various electronic equipment, and IC is broadly used especially as an active element. In case IC performs switching operation in such a signal circuit, a noise occurs, and this noise affects actuation of other surrounding circuit elements not a little.
[0003] In order to cancel such a fault, preparing respectively the noise reduction component which combined the noise filter, the chip inductor, and the chip capacitor, including in a signal circuit, and aiming at noise reduction is carried out.
[0004] However, since many component parts are needed while such a noise reduction component has an indispensable noise filter with a big configuration, circuitry not only becomes complicated, but a cost rise is not avoided.
[0005] For this reason, as shown in drawing 6 , the chip mold impedance component of easy structure is formed by forming the straight-line-like conductor 22 in the magnetic substance 21, in order to avoid such evil, and using this impedance component as a noise reduction component is performed.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] Without complicating circuitry, since the coil was formed in the magnetic substance which consists of a specific presentation according to this invention as stated above, and an impedance can be raised, a cost rise can be avoided and sufficient noise reduction effectiveness can be acquired with easy structure.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, since a conductor is only formed in the shape of a straight line, and he is trying to constitute an impedance from a conventional chip mold impedance component, and only a low impedance is obtained, there is a problem that sufficient noise reduction effectiveness is not acquired.
[0007] It aims at offering the laminating mold impedance component which consists of one chip which can avoid a cost rise and can acquire sufficient noise reduction effectiveness with easy structure, without this invention's having coped with the above problems, having made it, and complicating circuitry.

[Translation done.]

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention is characterized by said magnetic substance consisting of an oxide magnetic compact which uses nickel, Cu, and Zn system ferrite as a principal component in the laminating mold impedance component which has the coil which is connected through the magnetic substance and consists of an electric conduction pattern.
[0009] Moreover, for other this inventions, said oxide magnetic compact is Fe 2O3. : When it consists of Amol%, NiO:Bmol %, CuO:Cmol %, ZnO:Dmol %, and CoO:Emol % and considers as A+B+C+D+E=100-mol%, it is characterized by setting A thru/or E as the range of 46<=A<=500<=B<=500<=C<=300<=D<=350<=E<=3 respectively.
[0010] Furthermore, as for other this inventions, said oxide magnetic compact is characterized by the mean particle diameter of the raw material at the time of mixing before sintering consisting of 1.0 micrometers or less.
[0011] furthermore, other this inventions -- said electric conduction pattern -- Pd -- less than [5wt%] -- it is characterized by being formed with the conductor which consists of an Ag alloy to contain.
[0012] Furthermore, other this inventions are characterized by said electric conduction pattern consisting of an Ag alloy with which purity contained 99.5% or more of Ag.

[Translation done.]

OPERATION

[Function] According to the configuration of this invention according to claim 1, the coil which consists of an electric conduction pattern is prepared through the oxide magnetic compact which uses nickel, Cu, and Zn system ferrite as a principal component, and a laminating mold impedance component is formed.
[0014] According to the configuration of this invention according to claim 2, a laminating mold impedance component is formed by combining a specific component in the specific range respectively as a raw material of said oxide magnetic compact.
[0015] According to the configuration of this invention according to claim 3, when the mean particle diameter uses the thing of a specific value as a raw material of said oxide magnetic compact, a laminating mold impedance component is formed.
[0016] According to the configuration of this invention according to claim 4, a laminating mold impedance component is formed by combining a specific component in the specific range respectively as a raw material of said electric conduction pattern.
[0017] According to the configuration of this invention according to claim 5, a laminating mold impedance component is formed by using a specific component in the specific range as a raw material of said electric conduction pattern.

[Translation done.]

* NOTICES *

EXAMPLE

[Example] With reference to a drawing, the example of this invention is explained below.
[0019] Drawing 1 is the outline sectional view showing the example of the laminating mold impedance component of this invention, and shows the structure in which the coil of three turns for example, was formed inside. this example laminating mold impedance component 1 has the magnetic substance 3 which consists of an oxide magnetic compact which uses nickel, Cu, and Zn system ferrite as a principal component, the coil 5 which consists of a spiral electric conduction pattern 2 which this magnetic substance 3 is connected through the layered product 4 sintered by one, and goes around, and the external terminals 6 and 7 of a pair respectively connected to the both ends of a coil 5.
[0020] Moreover, the oxide magnetic compact which constitutes said magnetic substance 3 is Fe 2O3. : When nickel which consists of Amol%, NiO:Bmol %, CuO:Cmol %, ZnO:Dmol %, and CoO:Emol %, Cu, and Zn system ferrite are used and it considers as A+B+C+D+E=100-mol%, A thru/or E are respectively set as the following range.
[0021] 46<=A<=500<=B<=500<=C<=300<=D<=350<=E<=3 [0022] moreover, the electric conduction pattern 2 which constitutes said coil 5 -- Ag -- Pd -- less than [5wt%] -- it is formed with the conductor which consists of an Ag-Pd alloy to contain.
[0023] Here, the equal circuit of the laminating mold impedance component 1 of this example of drawing 1 can be treated as a 2 terminal impedance component, and by having a coil 5 in the magnetic substance 3 can show it like drawing 2 . namely, a lost part and the conductor of the magnetic substance 3 -- it has a series circuit with the inductive reactance jomegaL which uses as a principal component the inductance of the equivalent resistance R which doubled resistance, and a coil 5, and the composition that parallel connection of the capacitive reactance-j (1-/omegaC) which is floating to the layered product 4 was carried out to this.
[0024] The impedance Z of an impedance component is shown like a degree type.
[0025]
[Equation 1]
Z={R/(omegaCR)2+(1-omega2 LC)2}+j {omegaL(1-omega2 LC)-omegaCR2/} / {(omegaCR) 2+(1-omega2 LC) 2}
[0026] Although this equal circuit is conventionally [which was shown in drawing 6] applicable also to a component, since the value of the component of jomegaL is low, that impedance characteristic becomes like B of drawing 4 , and serves as a small impedance from the property A of this example component. That is, in the case of this example component, the high impedance Z can be shown, and it can make the actuation which was excellent as a noise reduction component perform by forming a coil 5 in the magnetic substance 3.
[0027] That is, in the frequency band of the signal used in a circuit, an impedance Z is low enough so that the signal may not be attenuated, and an impedance component which presents the high impedance Z which fully attenuates this to a noise is called for. Since the noise component has a frequency component higher than a signal component, attenuation is demonstrated only to this high noise frequency component, and very low attenuation is demonstrated to a low signal frequency component, namely, the impedance component which produces a low insertion loss must be realized.
[0028] When its attention is paid to the frequency band of a signal, since the stray capacity C in the equal circuit of drawing 2 is at most several pF, the equal circuit can be shown like drawing 3 in approximation. Therefore, an impedance Z becomes only Z=R+jomegaL and the absolute value of an impedance Z is shown like a degree type.
[0029]
[Equation 2]

$$|Z| = \sqrt{R^2 + \omega^2 L^2}$$

[0030] the conductor of the electric conduction pattern 2 which is making Resistance R so that clearly from this several 2 -- it becomes realizable by falling resistance to lower the impedance Z of an impedance component and to lower an insertion loss.
[0031] Ag with the lowest resistance is chosen in all conductor material in that what has low resistance is desirable as for the conductor material of the electric conduction pattern 2 which constitutes a coil 5. Although the melting point of this Ag is about 960.5 degrees C and has the value lower than the sintering temperature of the usual oxide magnetic compact, since about 100 degrees C or more of things for which the sintering temperature of the magnetic substance is lowered to the melting point of Ag will lower it rather than the usual sintering temperature, it is difficult from the point of making the magnetic substance equipped with a predetermined property. The melting point as a conductor material can be raised now at this point rather than Ag by making Ag contain Pd. Making the content of Pd increase not much will raise resistance of the Ag-Pd alloy as a conductor material, it will raise the impedance Z of an impedance component, and it becomes impossible however, to satisfy the conditions that only the noise required of a noise reduction component as a result must not be reduced, and the signal of a signal circuit must not be reduced.
[0032] [Table 1] shows change of the direct current resistance and the insertion loss at the time of changing various component ratios (wt%) of the Ag-Pd alloy used as a conductor material of the electric conduction pattern 2 which constitutes a coil 5 in this example.
[0033]
[Table 1]

No	Ag : Pd	直流抵抗	挿入損失
1	100 0	0.20 Ω	0.04dB
2	99 1	0.29	0.04
3	98 2	0.38	0.05
4	96 4	0.57	0.07
5	95 5	0.66	0.07
6	94 6	0.75	0.08
7	92 8	0.94	0.10
8	90 10	1.12	0.11

[0034] Since it becomes higher than the case where the melting point is Ag100% so that the ratio of Pd of an Ag-Pd alloy is raised in [Table 1], it is necessary to also make sintering temperature of the magnetic substance high. However, direct current resistance and an insertion loss increase [tend] gradually and are not so desirable as the ratio of Pd is raised. Therefore, if both who are mutually contradictory are taken into consideration from a practical viewpoint, it can limit under the condition that Pd content with which an insertion loss is mostly equivalent to 0.07dB or less is the range where below five (wt%) is desirable practically. No.1 thru/or No.5 correspond to this.
[0035] Consequently, it is necessary to carry out low temperature sintering of the magnetic substance at the temperature below the melting point of conductor material. By choosing sintering temperature within the limits of this, the phenomenon which is desirable as for neither fusion of the Ag-Pd alloy which constitutes a conductor pattern 2, nor evaporation can be avoided, and the depression as a coil can be prevented.
[0036] That sintering temperature is set up in connection with the melting point of the Ag-Pd alloy which is the conductor of the electric conduction pattern 2 which forms on this the oxide magnetic compact which constitutes the magnetic substance 3 from the above thing. Usually, the sintering temperature of the oxide magnetic compact using nickel, Cu, and Zn system ferrite is set as 1,050 degrees C thru/or 1,100 degrees C. Moreover, as for Ag used, it is

desirable to have 99.5% or more of purity.
[0037] Here, since it stops agreeing in the melting point of the Ag-Pd alloy of the component of said range in having used the thing of a presentation which has the usual sintering temperature (about 1,050 degrees C thru/or 1,000 degrees C) as an oxide magnetic compact of nickel, Cu, and Zn system ferrite, the device which lowers this sintering temperature is needed. Moreover, if the specific resistance of a ferrite ingredient is low, with the structure where the conductor pattern 2 touches the direct magnetic substance 3 directly like this example laminating mold impedance component 1, it will become difficult for the insulating engine performance between the coils of a coil 5 to come to be inferior, and to present practical use. For this reason, it is at least 105 as specific resistance. It has the resistance more than omegacm and it is necessary to prepare nickel of a presentation which has the sintering temperature below the melting point of the above mentioned Ag-Pd alloy, Cu, and Zn system ferrite.
[0038] In order to fill such a demand, it becomes possible by sintering using the presentation ingredient which made particle size small enough. [Table 2] shows change of the specific surface area at the time of changing the particle size of nickel and Cu which form the oxide magnetic compact which constitutes the magnetic substance 3, and Zn system ferrite ingredient, sintered density, and a presentation in this example.
[0039]
[Table 2]

No.	平均粒径 (μm)	比表面積 (m³/g)	焼結密度 (g/cm³)	組成（mol%）			
				Fe₂O₃	NiO	CuO	ZnO
1	1.5	3.3	4.01	48.1	26.6	8.3	17.0
2	0.5	5.6	4.49	48.2	26.5	8.1	17.2
3	0.3	8.5	4.75	48.1	26.5	8.3	17.1

焼結温度：875℃

[0040] It sets to [Table 2] and they are the mean particle diameter of 0.5 micrometers, specific surface area of 5.6m 2 / g, and sintered density 4.5 g/cm3. By using the particle of extent, the oxide magnetic compact which has the sintering temperature enough ****(ed) by practical use is realizable. If the average of particle size is about 1.0 micrometers or less, it can obtain a desirable result.
[0041] The oxide magnetic compact which consists of nickel, Cu, and a Zn system ferrite ingredient is Fe 2O3, although the presentation ratio shows various magnetic properties. Since more 2nd phase to which the amount made NiO and CuO the subject less than [46mol%] is formed, the magnetic properties deteriorate and practical use is not presented. Moreover, Fe 2O3 When an amount exceeds 50-mol%, sintering temperature is alphaFe 2O3 below 950 degrees C. Since a phase is formed as the 2nd phase and this works as a factor which checks sintering, desirable sintering temperature cannot be acquired.
[0042] Furthermore, since Curie temperature descends to near ordinary temperature in the field beyond 35mol%, practical use will not be presented with the amount of ZnO(s). the presentation with little [further again] ZnO to the ferrite containing NiO -- at least -- CuO -- more than 4mol% -- since sintered density will become low if are not contained, and sintering temperature becomes 950 degrees C or less, practical use will not be presented. Moreover, although CuO shows magnetic properties more than 30mol%, since the fall of flux density is remarkable, it is not desirable in order for an allowable-current value to fall practically and for the engine performance to be inferior.
[0043] Next, the manufacture approach of the laminating mold impedance component of this example is explained.
[0044] (1) Dry after mixing each raw material with water with a steel ball with a ball mill for 16 hours so that the last presentation after manufacture grinding of a fine-particles ingredient may become ZnO17.0mol% CuO8.3mol% NiO26.6mol% Fe2 O3 48.1mol%. Next, dry fine particles are ****(ed) at 750 degrees C for 2 hours. After an after [****] ball mill grinds with water and a steel ball for 50 hours, it dries and a fine-particles ingredient is obtained.
[0045] Here, 2 double weight of ingredient weight was respectively used [the 1/2 inch ball] for the conditions of a ball mill for 2 double weight and the 1/8 inch ball of ingredient weight by water, using the 3 time weight of ingredient weight as a steel ball. Moreover, desiccation was performed using the air forced oven held at 200 degrees C.

[0046] (2) Manufacture of the coating for laminatings, next (1) A pen shell mixer performs mixed churning for 20% of toluene, 20% of ethyl alcohol, 40% of butanol, and 4% of #N200 ethyl-cellulose resin to the obtained fine-particles ingredient for 1 hour. Then, the bead mill of 3mm of diameters phi of a bead is passed, and the coating for laminatings is obtained.
[0047] (3) Use a laminating and a baking laminating screen printer and it is (2). The green sheet layered product which you connected [layered product] the electric conduction pattern which should form the coil of three turns for example, through the coating for laminatings, and made it go around is obtained using the obtained coating (oxide magnetic compact ingredient) Ag paste for laminatings (paste containing an Ag-Pd alloy) by printing repeatedly by turns in the shape of [suitable] a substrate. Then, sintering processing of the green sheet layered product is carried out at 875 degrees C for 2 hours.
[0048] (4) Form an external terminal by carrying out sequential plating of Cu, nickel, and Ag on Ag layer baked by electroplating after applying Ag paste to the both ends of the layered product obtained by formation sintering of an external terminal and burning at 600 degrees C for 1 hour.
[0049] The laminating mold impedance component by which the coil 5 of 3 turns was formed in the interior as shown in drawing 1 according to each above process can be manufactured.
[0050] Drawing 5 shows the impedance characteristic of the laminating mold impedance component obtained by this example, the impedance of about 60 ohms is obtained by 10MHz, the impedance of about 600 ohms is obtained by 100MHz, and a desirable property is acquired.
[0051] Thus, without according to this example, coming to obtain a high impedance and complicating circuitry, since the coil was formed in the magnetic substance which consists of a specific presentation, a cost rise can be avoided and sufficient noise reduction effectiveness can be acquired with easy structure.
[0052] In addition, although the example in which the coil of 3 turns was formed in the magnetic substance explained in the example, this can be set as the number of arbitration according to the impedance characteristic which shows and needs an example. Moreover, the electric conduction pattern which forms a coil may form a multilayer straight-line-like parallel connection pattern not only in a pattern but in the interior around gone to a spiral, and the internal electric conduction pattern is arbitrary.
[0053]

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view showing the example of the laminating mold impedance of this invention.
[Drawing 2] It is the equal circuit of this example component.
[Drawing 3] They are other equal circuits of this example component.
[Drawing 4] It is the impedance-characteristic Fig. which compares a component this example component and conventionally.
[Drawing 5] It is the impedance characteristic of the impedance component obtained by this example.
[Drawing 6] It is the perspective view showing a component conventionally.
[Description of Notations]
2 Electric Conduction Pattern
3 Magnetic Substance
4 Layered Product
5 Coil
6 Seven External terminal

[Translation done.]